

REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 11, 12, 18-20, 22, 24-29, 31-35, 37 and 39-46 are presented for consideration.

Claims 11, 18, 27 and 28 are independent. Claims 12, 14-16, 30, 36 and 38 have been canceled without prejudice or disclaimer. Claims 11, 27 and 31-34 have been amended to clarify features of the subject invention. Support for these changes can be found in the original application, as filed. Therefore, no new matter has been added.

Applicant requests favorable reconsideration and withdrawal of the rejection set forth in the above-noted Office Action.

Claims 11, 12, 14-16, 18-20, 22 and 24-46 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,694,247 to Ophey et al. Applicant submits that the cited art does not teach or suggest many features of the present invention, as previously recited in claims 11, 12, 14-16, 18-20, 22, and 24-46. Therefore, these rejections are respectfully traversed. In addition, Applicant submits that the cited art does not teach or suggest the salient features of Applicant's invention, as recited in claims 11, 12, 18-20, 22, 24-29, 31-35, 37 and 39-46, as presented.

In one aspect of the present invention, independent claim 11 recites a projection optical system that includes a plurality of lenses that cause birefringence, and at least one optical element having a stress distribution, the stress distribution substantially eliminating the birefringence

caused by the plurality of lenses. The at least one optical element is disposed between the plurality of lenses and an image plane of the projection optical system.

In another aspect of the present invention, independent claim 18 recites a projection exposure apparatus including an illumination system for illuminating a reticle with light, and a projection optical system for projecting a pattern of the reticle onto a wafer. The projection optical system includes a plurality of lenses that cause birefringence, and at least one optical element for substantially eliminating the birefringence caused by the plurality of lenses. The at least one optical element is disposed between the plurality of lenses and an image plane of the projection optical system.

In a further aspect of the present invention, independent claim 27 recites a projection optical system including a plurality of lenses that cause birefringence, and at least one optical element having a stress distribution, the stress distribution substantially eliminating the birefringence caused by the plurality of lenses. The at least one optical element is disposed near a pupil of the projection optical system.

In still another aspect of the present invention, independent claim 28 recites a projection exposure apparatus that includes an illumination system for illuminating a reticle with light, and a projection optical system for projecting a pattern of the reticle onto a wafer. The projection optical system has a plurality of lenses that cause birefringence, and at least one optical element for substantially eliminating the birefringence caused by the plurality of lenses. The at least one optical element is disposed near a pupil of the projection optical system.

Applicant submits that the cited art does not teach or suggest such features of the present invention, as recited in independent claims 11, 18, 27 and 28.

The Ophey et al. patent discusses an optical transmissive component with anti-reflection gratings. The optical transmissive component 1 includes an entrance surface 4 and an exit surface 5 for optical radiation 20, in which one of the surfaces 4, 5 is provided with an anti-reflection grating 10, 15. A second surface 5, 4 is provided with a second anti-reflection grating and grating strips 11 of the first grating 10 are ensured to extend essentially perpendicularly to those 16 of the second grating 15 in corresponding areas of the first and the second surfaces 4, 5. By this arrangement, the Ophey et al. patent seeks to prevent the optical transmissive component 1 from being birefringent.

Applicant submits, however, that the Ophey et al. patent does not teach or suggest the salient features of Applicant's present invention, as recited in independent claims 11, 18, 27 and 28. Specifically, in the present invention recited in independent claims 11 and 27, the projection optical system is arranged so that the stress distribution substantially cancels birefringence. In the Ophey et al. patent, the birefringence is said to be removed by a diffraction grating. In this regard, the Ophey et al. patent does not teach or suggest cancelling birefringence by a stress distribution in the manner of the present invention recited in independent claims 11 and 27.

Further, the present invention, as recited in independent claims 18 and 28, relates to various aspects of projection exposure apparatus. The Ophey et al. patent, on the other hand, relates to a magneto-optical memory or a liquid crystal projector. Applicant submits that the

Ophey et al. patent is silent with respect to a projection exposure apparatus, in the manner of the present invention recited in independent claims 18 and 28. Specifically, Applicant submits that the Ophey et al. patent does not teach or suggest the arrangement of the illumination system and the projection optical system in the projection exposure apparatus of the present invention, as recited in independent claims 18 and 28, in which the illumination system illuminates a reticle with light and the projection optical system projects a pattern of the reticle onto a wafer, the projection optical system having a plurality of lenses that cause birefringence, with at least one optical element for substantially eliminating the birefringence caused by the plurality of lenses in which the at least one optical element is disposed between the plurality of lenses and an image plane of the projection optical system (independent claim 18) or near a pupil of the projection optical system (independent claim 28). Accordingly, the Ophey et al. patent likewise does not teach or suggest many features of the present invention, as recited in independent claims 18 and 28.

For the reasons noted above, Applicant submits that the present invention, as recited in independent claims 11, 18, 27 and 28, is patentably defined over the cited art.

Dependent claims 19, 20, 22, 24-26, 29, 31-35, 37 and 39-46 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicant further submits that the instant application is in condition for allowance.

Favorable reconsideration, withdrawal of the rejection set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,

  
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